

2. Dorsal eyes far in front of the centre of cephalothorax; frontal margin not, or but little, emarginate; dorsal eye-tubercle destitute of a longitudinal middle groove. Hands flattened. Tail slender EUSCORPIUS, n.*
Type *E. carpathicus*, (Linn.), 1767.

II.—On some Species of Terebratulina, Waldheimia, and Terebratella from the Upper Tertiary Deposits of Mount Gambier and the Murray-River Cliffs, South Australia.
By R. ETHERIDGE, jun., F.G.S.

[Plates I. & II.]

I AM indebted to the kindness of the President and Council of the Geological Society of London, through the Assistant Secretary, Mr. W. S. Dallas, F.L.S., and to Mr. T. Davidson, F.R.S., for the opportunity of describing four of the following species from the Tertiary beds of Mount Gambier. The remaining specimen I have been permitted to borrow from the small foreign collection of the Museum of Practical Geology; it is from similar beds at the Murray-River Cliffs, near the Great Bend, South Australia. Had it not been for Mr. Davidson's considerate help, both in information and the loan of specimens, I should have been unable to complete these notes; I therefore take this opportunity of thanking him for his kind assistance.

Bibliography.—So far as known to me, the following is a brief digest of previous writings in connexion with Australian Tertiary Brachiopoda.

Capt. Sturt, during his memorable exploration of the river Murray, collected a few fossils from the Murray Cliffs, which are figured in the account of his exploration †. The only Brachiopod there represented ‡ was afterwards described and figured from another locality by Mr. G. B. Sowerby, in Count

late flavo-testaceis; cephalothorace subtilissime granuloso, segmenta duo prima caudæ conjunctim longitudine paullo superante; cauda cephalothorace quadruplo longiore, segmentis anterioribus desuperne visis in lateribus leviter rotundatis; dentibus pectinum circa 13. Long. circa 54 millim. Nova Hollandia.

* εὐ-, well, true; σκορπίος, scorpion. I have preferred the termination *us* to *o* or *on* in names composed of σκορπίος (-ίων) and another Greek word, a scorpion being in Greek called σκορπίος; σκορπίων signifies the shooting-engine called by the Romans *scorpio* or *scorpius*.

† Two Expeditions into the Interior of S. Australia, 1832. 2 vols. 8vo.

‡ T. 3. f. 15.

Strzelecki's work on New South Wales*, as *Terebratula compta*. The Rev. Julian E. Woods has frequently alluded to the occurrence of this little shell in the Tertiary deposits of Southern Australia, in various papers communicated to the Geological Society of London† and the Royal Society of Victoria‡, and again in his work on the geology of South Australia, where it is also figured§. Mr. C. S. Wilkinson informs us that *T. compta* occurs in the upper part of the Spring-Creek section, about fourteen miles south of Geelong||, in beds which were regarded by Mr. R. Daintree as probably the equivalent of the Mount-Gambier series¶. In 1862 Mr. Davidson described**, under the name of *Waldheimia Gari-baldiana*, a species supposed to be from the Tertiary beds of Malta, but which he now believes to be from South Australia. Prof. M'Coy has named two new species of Brachiopoda from Victorian Tertiary beds, viz. *Terebratula corioensis* and *Waldheimia macropora* (but, so far as I am aware, he has not yet described or figured them), and has recorded the occurrence of *Rhynchonella lucida*, Gould††.

Description of the Species.

Genus TEREBRATULA, Llwyd.

Subgenus TEREBRATULINA, D'Orbigny.

Terebratulina? Davidsoni, sp. nov. (Pl. I. fig. 1, a, b, c.)

Sp. char. Shell small, oval, flattened, tapering towards the beak, rounded towards the front; lateral margins in one plane, not sinuous. Ventral valve slightly convex, with the beak but little produced, truncated by a slightly oblique foramen more or less below the apex of the beak, excavated out of its substance, and completed by the two small deltidial plates and the umbo of the dorsal valve. Imperforate or dorsal valve almost flat, with the slightest indication of a mesial sinus in the front; hinge-line a little arched. Surface of both valves ornamented with a large number of fine radiating ribs, occasionally bifurcating, and a few concentric lines of growth;

* Physical Description of New South Wales and Van Diemen's Land &c., 1845, p. 296, t. 19. f. 4.

† Quart. Journ. Geol. Soc. 1860, xvi. p. 255; *ibid.* 1865, xxi. p. 393, &c.

‡ Transactions Roy. Soc. Vict. vi. p. 6 &c.

§ Geological Observations in S. Australia, 1862, 8vo, p. 74, woodcut.

|| "Report on Cape Otway District," Geol. Surv. Vict. 1865, p. 23.

¶ Geol. Surv. Vict. ¼ sheet 28 S.E., note.

** Geologist, 1862, v. p. 446.

†† Smyth's Progress Report, Geol. Surv. Vict. 1874, p. 36.

margins crenulate. In the dorsal valve there is no indication of a mesial septum; the socket-ridges are strong and well developed. Length $3\frac{1}{4}$ lines, width $2\frac{3}{4}$ lines, depth $1\frac{1}{4}$ line.

Obs. I beg to name this beautiful little shell after Mr. T. Davidson, to whom, as previously stated, I am under many obligations. Although all the internal portions of the dorsal valve are not preserved, the entire absence of the mesial septum, with the characters of the beak in the ventral valve, appear to indicate this as a species of *Terebratulina*.

Loc. and Horizon. Coralline Limestone of Mount Gambier, S. A. Coll. Geol. Soc. Lond., presented by the Rev. J. E. Woods.

Subgenus WALDHEIMIA, King.

Waldheimia Garibaldiana, Davidson. (Pl. I. figs. 2 a & b.)

W. Garibaldiana, Dav., The Geologist, 1862, v. p. 446, t. 24. f. 9.

Sp. char. Shell obscurely pentagonal, with the lateral margins flexuous, and the ventral valve the more convex of the two. Ventral valve convex and rather deep, divided into three portions by two diverging ridges or ribs, which commence close to the extremity of the beak, and extend to the front, leaving between them a slightly concave or flattened space resembling a broad and depressed keel, in which three or four longitudinal ribs are to be seen; the lateral portions of the valve become gradually and gently concave as they approach the margins, and are obscurely wrinkled by a few longitudinal or, more properly speaking, curved ribs; beak produced, incurved, and truncated by a slightly oblique foramen, separated to some extent from the hinge-line by a deltidium. The dorsal valve is also divided into three portions, the central space being flattened and furrowed by three or four longitudinal obtusely rounded ribs, while the lateral portions become more elevated as the front is approached, and are ornamented by six or seven curved ribs, which become somewhat obscured as they approach the margin of the shell. Interior unknown. Length 1 inch 7 lines, width 1 inch 3 lines, depth 10 lines.

Obs. The above is Mr. Davidson's excellent description of this handsome shell almost in his own words. When originally described, *W. Garibaldiana* was supposed to have come from the Tertiary beds of Malta; but Mr. Davidson afterwards satisfied himself that it in reality came from Mount Gambier. The nature of the matrix filling the valves bears out this view, if matrix can be accepted as a test; for it agrees exactly in lithological character with that adhering to authenticated specimens from the same locality. Mr. Davidson

states that *W. Garibaldiana* bears a close resemblance to *W. flavescens*, Lamarck, now living in Port Jackson, Sydney, but it is less ovate, the beak is less elongated, and it has a smaller foramen.

Loc. and Horizon. Coralline Limestone of Mount Gambier, S. A. Cabinet of Mr. T. Davidson, F.R.S.

Waldheimia Taylora, sp. nov. (Pl. I. figs. 3 a, b, c.)

Sp. char. Shell large, elongato-ovate, very inequivalve, longer than wide, greatest width near the middle. Ventral valve exceedingly convex, attenuated towards the beak, with two slightly diverging obtusely rounded ridges proceeding from the latter towards the front, where they become lost, and enclosing between them a narrow space, which in its upper part is rounded, but becomes flattened or a little concave towards the front of the shell; the lateral portions of the valve are also flattened but not concave; beak produced, incurved, and truncated by an oblique circular foramen, contiguous to the umbo of the dorsal valve, but separated from it by a small deltidium. Dorsal valve as wide as the ventral, slightly convex in the umbonal region, becoming almost flat towards the front, but presenting in its longitudinal outline a gentle continuous convexity. Lateral margins a little flexuous. Surface marked by a few concentric lines of growth; shell distinctly punctate. The position of the mesial septum is traceable on the surface of the dorsal valve as a fine impressed line; interior otherwise unknown. Length 2 inches $3\frac{1}{2}$ lines, width 1 inch 10 lines, depth 1 inch 5 lines.

Obs. Although, in the partial tripartite division of the ventral valve, *W. Taylora* approaches *W. Garibaldiana*, it may be at once distinguished, irrespective of size, by the total absence of all ribbing of the valves, and by the gently convex outline of the dorsal valve, as compared with the tripartitely divided similar valve of *W. Garibaldiana*. *Terebratella compta*, G. B. Sowerby, is to be distinguished from the new species by the following external characters—its much smaller size, more triangular form of the dorsal valve, much larger deltidial area, and consequent separation of the foramen and umbo, more pointed outline of the front margin of the shell, more flattened outline of the dorsal valve, especially in the umbonal region, and a less incurved, but more obliquely truncated beak. Some forms of *Terebratula ovata*, Sowerby, from the Cretaceous series, are at first sight not unlike *W. Taylora*, but there is no trace of the longitudinal depression of the dorsal valve of that species or of the irregular surface-rugæ.

As we are at present unacquainted with the interior of this

shell beyond the impressed line on the surface of the dorsal valve representing the mesial septum, its exact generic affinity must remain an open question, although it is in all probability a *Waldheimia* or *Terebratella*. The specimen was forwarded to Mr. Davidson, who was kind enough to suggest its reference to the former subgenus. I name the species after my friend and former colleague Mr. Norman Taylor, of the Victorian Geological Survey and Mining Department.

Loc. and Horizon. Coralline Limestone of the Murray-River Cliffs, near the Great Bend, S. A. Blanford Collection, *Mus. Pract. Geology*, London.

Waldheimia gambierensis, sp. nov. (Pl. II. figs. 4 a-d.)

Sp. char. Shell elongate, much longer than wide, somewhat fig-shaped, notched in front, valves convex. Ventral valve the larger and more convex of the two, obtusely bicipitated towards the front, with a short shallow sulcus between the plaits, and two similar lateral ones corresponding to two ill-defined lobes in the dorsal valve; beak moderately produced, truncated by an oblique large circular foramen, encircled by the apex of the beak and the deltidium. Dorsal valve convex in the median and umbonal regions, produced more or less towards the front, with a broad median longitudinal plait, only apparent near the front margin, bounded by two short lateral sulci, corresponding to the two previously mentioned plaits of the ventral valve. Lateral margins curved; front margin sinuated. Surface of the shell marked with concentric lines of growth. An impressed line, showing the position of the mesial septum, extends for six lines along the surface of the dorsal valve from the umbo, and can be traced still further as a dark line under the shell. Length 2 inches, width 1 inch $3\frac{3}{4}$ lines, depth 1 inch 1 line.

Obs. With the exception of the median septum, as previously indicated, we are not acquainted with the internal characters of this species; the position of the mesial septum is shown, as in *W. Taylora*, by an impressed line on the dorsal valve from the umbo forwards.

Loc. and Horizon. Coralline Limestone of Mount Gambier. Cabinet of Mr. T. Davidson, F.R.S.

Genus TEREBRATELLA, D'Orbigny.

Terebratella compta, G. B. Sowerby. (Pl. II. figs. 5 a-d.)

Terebratula, sp., Sturt, Two Expds. Int. S. Austr. 1832, ii. t. 3. f. 15.

Terebratula compta, G. B. Sow. Strzelecki's Phys. Descr. N. S. Wales and V. D. Land, 1845, p. 297, t. 19. f. 4; Woods, Geol. Obs. S. Austr. 1862, p. 74, woodcut.

Sp. char. Shell trapeziform, slightly longer than wide;
2*

valves unequally convex. Ventral valve longitudinally and obtusely carinate, convex, and tapering towards the beak, which is a little incurved, truncated by a slightly oblique circular foramen; beak-ridges sharply defined, enclosing between them and the hinge-margin a wide triangular area, flat or a little concave. Dorsal valve depressed, with a gentle curve from the umbo to the front; but in some specimens a slight longitudinal depression or sulcus exists towards the centre of the valve, extending to the front; hinge-line in some individuals a little curved, in others almost straight, giving to the valve a somewhat triangular form. Surface with a few concentric lines of growth. Shell-substance thin, punctate. Length 8 lines, width $6\frac{1}{2}$ lines, depth 4 lines.

Obs. Fig 5, *d*, representing the interior of the dorsal valve, exhibits some of the characters on which the reference of this species to the genus *Terebratella* is based. At the end of the median septum may be seen the broken horizontal process to which the loop would be attached in the perfect specimen. The oral processes, instead of being directed inwards towards the septum, are pointing forwards directly parallel to it. The above are the measurements of the largest specimen I have seen.

Loc. and Horizon. Coralline Limestone of Mount Gambier, S. A. *Coll. Geol. Soc. London.*

T. compta was originally figured by Capt. Sturt from a specimen obtained from the Coralline Limestone of the Murray-River Cliffs, near the Great Bend, S. A. Count Strzelecki's example, upon which Mr. G. B. Sowerby's description is founded, was obtained from a raised beach at Port Fairy. The Rev. Mr. Woods has recorded it from Mount Gambier*, S. A.; whilst Mr. C. S. Wilkinson has obtained it in considerable numbers from the Spring-Creek † section near Geelong, Victoria.

The following brief description of the appearance and extent of the Mount-Gambier Coralline Limestone is abstracted from the Rev. J. E. Woods's excellent work, 'Geological Observations in South Australia' ‡ :—

Immediately under the surface of the country in the Mount-Gambier district is usually found a brittle white limestone, much decomposed and without fossils, which gradually passes downwards into a hard and close perfectly white rock, horizontal, and distinctly stratified in layers or beds about

* Quart. Journ. Geol. Soc. 1860, xvi. p. 255 &c.

† Cape-Otway Report, 1865, p. 23.

‡ Pp. 58–125.

fourteen feet in thickness, with great regularity. The whole formation has much the appearance of chalk, containing both "sand-pipes" and layers of black and white flints, and in places is literally crammed with organic remains (Foraminifera, Entomostraca, Polyzoa, Echinoderms, and Mollusca), some of the species of which are identical with existing forms, whilst the whole bears a general resemblance to the fauna at present living on the neighbouring coast. The Foraminifera have been examined by Prof. T. Rupert Jones, F.R.S., and Mr. W. K. Parker, F.R.S., who consider them to be probably of Pliocene age and indicative of deep water*. The Polyzoa have also received attention at the hands of Prof. G. Busk, F.R.S.†, who considers it "probable that the formation in which they are found corresponds in point of relation to the existing state of things with the Lower Crag of England." The general appearance of the strata indicates that the particles of which they are formed were deposited in a tranquil sea, and derived from the destruction of coral reefs. This coralline limestone, or, as it is termed by Mr. Woods, the "Crag," is estimated by the latter to occupy probably at least one sixth of the whole of Australia, but to attain its chief development in that part of South Australia which extends from the coast on the south northwards to the Murray River, westward to the base of the Cape-Jervis range, whilst on the east a ridge of trap-rocks, corresponding to the 141st meridian of east longitude, along the limit of the colonies of Victoria and South Australia, serves as a boundary in that direction. This district, wholly occupied, with one or two trifling exceptions, by the coralline limestone or "Crag," contains an area of 22,000 square miles. Near the Great Bend of the Murray River the latter has cut its course through this formation, forming cliffs 150 feet high, from which Capt. Sturt, the great explorer, collected fossils in about 140° E. longitude, the majority of which are specifically identical, according to Mr. Woods, with the Mount-Gambier fauna, whilst the remainder are not found at the latter locality. Capt. Sturt states that in 1845 he found similar fossils in a limestone cropping out on both sides of Lake Torrens, whilst Mr. Woods believes that the greater portion of Central Australia is occupied by this deposit. In Victoria it is found still further eastward at Portland, underlying volcanic rocks, and extends along the coast to between Port Fairy and Cape Otway. Finally, in Tasmania beds have been described bearing a strong resemblance to the Mount-Gambier Coralline Limestone.

* Quart. Journ. Geol. Soc. 1860, xvi. p. 261.

† Ibid. p. 260.

EXPLANATION OF PLATES I. & II.

- Fig. 1. Terebratulina? Davidsoni*, R. Etheridge, jun., natural size. Tertiary Coralline Limestone, Mount Gambier, S. Australia. *a*, view of ventral valve; *b*, view of dorsal valve and foramen of ventral valve; *c*, interior of dorsal valve.
- Fig. 2. Waldheimia Garibaldiana*, Davidson, natural size. Tertiary Coralline Limestone, Mount Gambier, S. A. *a*, ventral valve; *b*, dorsal valve and foramen of ventral valve.
- Fig. 3. W. Taylora*, R. Etheridge, jun., natural size. Tertiary Coralline Limestone of the Murray-River Cliffs, S. A. *a*, ventral valve; *b*, dorsal valve, with the groove indicating the position of the septum, and the foramen of the ventral valve; *c*, lateral view of both valves.
- Fig. 4. W. gambierensis*, R. Etheridge, jun., natural size. Tertiary Coralline Limestone of Mount Gambier, S. A. *a*, view of ventral valve; *b*, dorsal valve and foramen of ventral valve; *c*, lateral view of both valves; *d*, view of sinuate front margin. (The figure 4 *a* is partially restored on the left-hand side, the shelly matter being there broken away.)
- Fig. 5. Terebratella compta*, G. B. Sowerby. Tertiary Coralline Limestone of Mount Gambier, S. A. *a*, view of ventral valve; *b*, view of dorsal valve and foramen of ventral valve, both enlarged one and a half times; *c*, interior of ventral valve; *d*, interior of dorsal valve, showing the dilated portion of the mesial septum: the two latter figures are of the natural size.

Figs. 3 *a, b, c* are from drawings kindly made for me by the late Mr. C. R. Bone, of the Museum of Practical Geology, shortly before his death; for the remainder I am indebted to the artistic skill of my friend Mr. B. N. Peach (of the Geological Survey of Scotland).

III.—*Critical Notes on the New-Zealand Hydroida, Suborder Thecaphora*. By MILLEN COUGHTREY, M.B., C.M. Edinb. Univ., Hon. Fellow Historic Soc. Lanc. & Ches., President of the Dunedin Naturalists Field-Club, N.Z., &c. &c.

[Plate III.]

To the last volume (no. vii.) of the 'Transactions of the New-Zealand Institute I contributed a paper on the New-Zealand Hydroida*, in which I gave the results of an examination of the type specimens of Capt. F. W. Hutton's paper on the New-Zealand Sertularians†, and of several new specimens I obtained on the New-Zealand coasts. Contrary to my usual practice, and with many misgivings on my part, these notes were rather prematurely published; and I regret now that I did not hold them back until I had more works of

* Vol. vii. pp. 281-293, plate xx.

† Trans. N.Z. Inst. vol. v. 1872.